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ABSTRACT

This module on tools and equipment is the second of four (CE 028 303-306) in the auto body repair course of a bilingual vocational training program. The course is designed to furnish theoretical and laboratory experience in welding, metal straightening, metal finishing, painting, and use of power and hand tools. Module objectives are for students to develop trade-related Spanish/English vocabulary; to identify the most widely used general purpose tools, straightening and specialty hand tools, electric and pneumatic power tools, major collision repair equipment, refinishing equipment, and their purposes; and to identify safety rules which apply to power tools and major collision repair equipment. Contents include list of module objectives; pretest; five sections on (1) general purpose tools, (2) straightening and specialty hand tools, (3) power tools, (4) major collision repair equipment, and (5) refinishing equipment; posttest; and English/Spanish vocabulary list. Each section is organized into this format: instructions, vocabulary, and concepts (statements or questions to direct reading) presented in English and Spanish; readings; and worksheets to evaluate comprehension of the trade-related reading material. Worksheets also cover these areas: vocabulary, definitions, word attack skills, writing skills, spelling, and application of terminology to the trade area. (YLB)

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ED199494

BILINGUAL VOCATIONAL TRAINING PROGRAM

AUTO BODY REPAIR

MODULE 2.0

TOOLS AND EQUIPMENT

U S DEPARTMENT OF HEALTH
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

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NORTHERN NEW MEXICO COMMUNITY COLLEGE
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CE 028 304

MODULE OBJECTIVES

1. To develop trade related Spanish/English vocabulary

2. To identify the most widely used general purpose tools

3. To identify straightening and specialty hand tools

4. To identify electric and pneumatic power tools and their purpose

5. To identify major collision repair equipment and its operation

6. To identify refinishing equipment and its purpose

7. To identify general safety rules which apply to power tools and major collision repair equipment

ACTIVITIES

To clarify the purpose of each reading, the instruction, vocabulary and concepts are presented in Spanish and English.

Readings are followed immediately by a series of diversified work-sheets which evaluate comprehension of trade related material.

Oral language development exercises, directed by the instructor, are presented to re-enforce written concepts. Students are encouraged to utilize and expand their technical vocabulary by engaging in discussion with other students, the instructor and the tutor.

Audio visual materials are utilized to introduce subject matter. These materials are readily available to students and may be used on an individual or group basis.

Students are instructed to utilize supplementary material available in the Learning and Resource Center, and as a result re-enforce concepts presented in the module.

MODULE CONTENTS

2.1 General Purpose Tools

2.2 Straightening and Specialty Hand Tools

2.3 Power Tools

2.4 Major Collision Repair Equipment

2.5 Refinishing Equipment

AUTO BODY REPAIR

Auto Body Repair is designed to furnish theoretical and laboratory experience in welding, metal straightening, metal finishing, painting and the use of power and hand tools. Shop procedures and equipment, common to that of the industry, are emphasized. Conditions and assignments are similar to those of a full time Auto Body repair shop.

EVALUATION

Module Pre-Test (Any student who scores 90% or below will complete entire module)

Module Post-Test (Any student who scores 90% or below will repeat areas where improvement is necessary)

Worksheets

Oral Exercises

Supplementary materials

PRE-TEST

1. List 5 categories of the most widely used general purpose tools.

2. List 4 categories of metal straightening hand tools.

3. List 4 pneumatically powered tools and their usage.

4. List 4 electrically powered tools and their usage.

5. List 2 pieces of major collision repair equipment.

6. List 5 pieces of refinishing equipment and its usage.

7. List 8 safety rules for power tools.

8. List 5 safety rules for major collision repair equipment.

Instructions:

The following reading contains information on general purpose tools. Read it carefully then complete the worksheets.

Instrucciones:

La siguiente lectura contiene información tocante herramienta de propósito general. Léale cuidadosamente y luego conteste los ejercicios.

Vocabulary	Vocabulario
screwdriver	destornillador
pliers	tenazas
socket	llave tubular
wrench	llave
brush	sepillo
hammer	martillo

Remember the following as you read .
Recuerde lo siguiente al leer.

1. The most widely used general purpose tools.
   La herramienta de propósito general que se utilíza más.

2. Uses of the various tools.
   Usos de la herramienta.

General Purpose Hand Tools

An auto body repairman should become entirely familiar with all kinds of tools and how each tool should be used before attempting any kind of repair on damaged vehicles.

General purpose tools which the auto body technician might use daily may easily be stored in a portable tool box. The following are some of the most widely used general purpose tools. These tools usually come in various forms and sizes designed to serve a specific purpose.

Screwdrivers - the two most common are standard and phillips. Standard screwdrivers have bladed ends, phillips screwdrivers have cross shaped ends. Others included are clutch head, standard or phillips offset, screw starter and screw extractor (see illustrations page 7).

Pliers - vary in sizes and shapes. These tools are used for bending, holding, cutting, etc. They include combination, diagonal, lineman, ribjoint, needle nose, hose clamp, snap ring, standard grip, chain wrench, C clamp, sheet metal and welding clamp (see illustrations pages 8-9).

Socket Sets - include ratchet, ratchet wrench, extension, break over handle, speed handle, hand impact driver, torx bit and sockets. Sockets come in six or twelve point types, which fit and grip six sided nuts and bolts snugly. Twelve point sockets are easier to get on and off. Socket sets usually include 1/4, 3/8, 1/2 and 3/4 inch drives (see illustrations page 10).

Wrenches - are tools used to hold or turn nuts, bolts, pieces of pipe or the like. These wrenches include pipe, adjustable, open end, box end, combination open box end, etc. (see illustrations page 11).

Brushes - are used for removing rust and paint. They include the wire and carbon brushes (See illustrations page 12).

Hammers - are used mostly for removing dents from sheet metal but are also used to strike blows when great force is needed. Two examples are ball peen and mallet hammers (See illustrations page 12).

Assorted Metal Cutters - are tools used for cutting or punching holes in metal. They include scratch awl, chisel, punch, drill bit, tin snips, cruncut tool and hacksaw (See illustrations page 13).

Assorted Purpose - are tools that do not fit into the other categories, however, they are very useful in the trade. They include cotter pin puller, pry bar, tapered reamer, file, tire tool, tap and die, vise, putty knife, soldering gun, measuring tape, oil can, etc. (See illustrations pages 14-15

Many hazards can occur through lack of tool maintenance. Accidents such as flying chip from a mushroom headed chisel, a greasy wrench that slips from a tight bolt can cause great injury to a repairman. The repairman must always practice safety when working with tools.

Fill in the blanks

1. The most common screwdrivers are _____and _____.

2. Tools used to hold or turn nuts, bolts, pieces of pipe or the like are _____.

3. Wire and carbon _____are used for removing rust and paint.

4. Hazards can occur through lack of tool _____.

5. The scratch awl, chisel, punch and drill bit are _____ _____.

6. Besides removing dents, _____are also used where great force is needed.

7. The needle nose, lineman and diagonal are three types of _____.

8. The _____and _____are two types of wrenches.

9. General purpose tools are easily stored in a portable _____ _____

10. Standard screwdrivers have _____ends.

True or False

_____1. Screwdrivers are used for bending and cutting bolts.

_____2. Auto body repairman do not need general purpose tools.

_____3. Six point type sockets are easier to get on or off.

_____4. Pliers are used for holding, bending, cutting, etc.

_____5. The repairman must always practice safety when working with tools.

_____6. Two types of brushes are the ball peen and mallet.

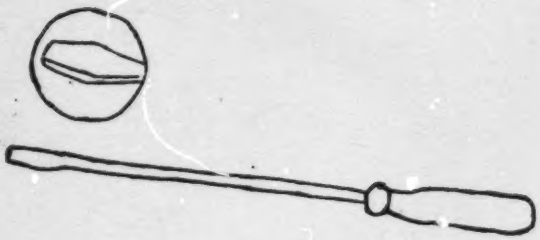
_____7. Socket sets usually include 1/4, 3/8, 1/2 and 3/4 inch drives.

_____8. Metal cutters like drill bits are used to cut or punch holes in metal.

_____9. The most common screwdrivers are the open end and the adjustable.

_____10. General purpose tools are kept in a portable tool box.

SCREWDRIVERS

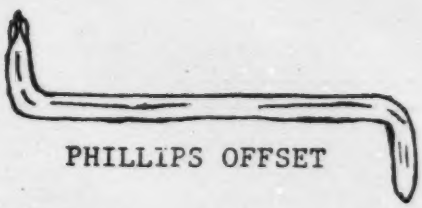


STANDARD

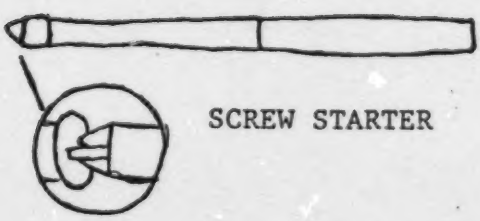
PHILLIPS

STRAIGHT OFFSET

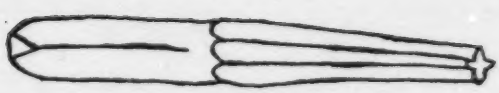
CLUTCH HEAD



PHILLIPS OFFSET

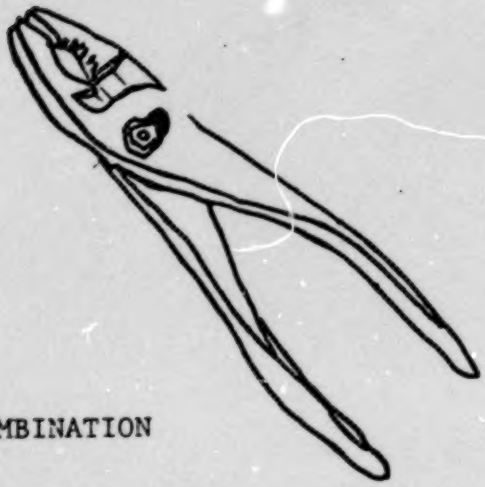


SCREW STARTER

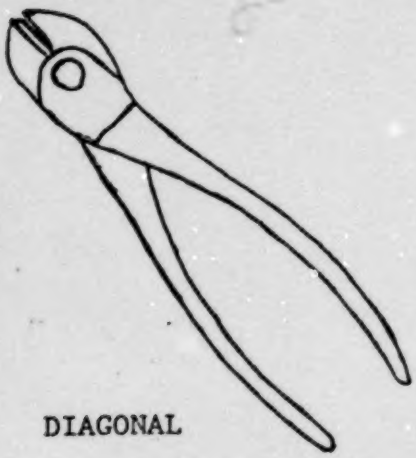


SCREW EXTRACTOR

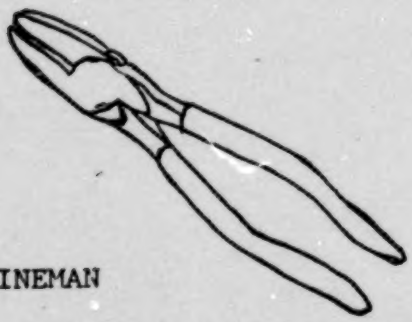
PLIERS



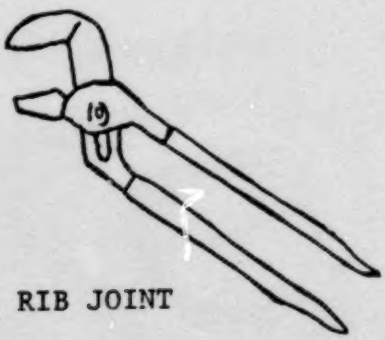
COMBINATION



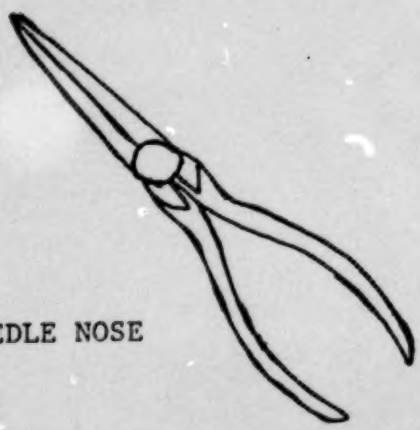
DIAGONAL



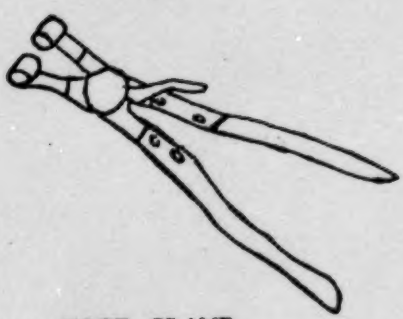
LINEMAN



RIB JOINT

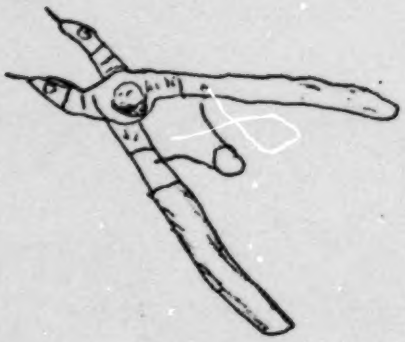


NEEDLE NOSE



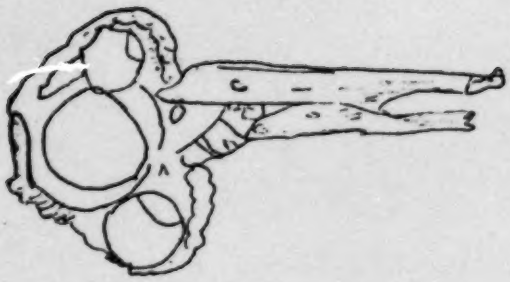
HOSE CLAMP

PLIERS (CONT'D)



SNAP RING

STANDARD GRIP



CHAIN WRENCH

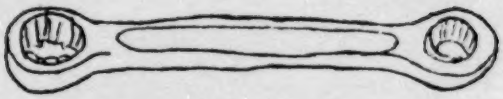
"C" CLAMP

SHEET METAL

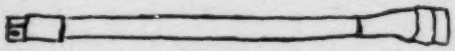
WELDING CLAMP

SOCKET SETS

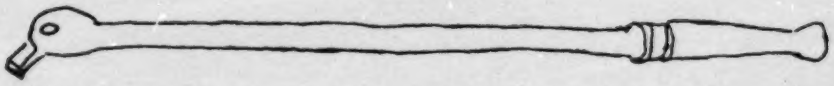
RACHET



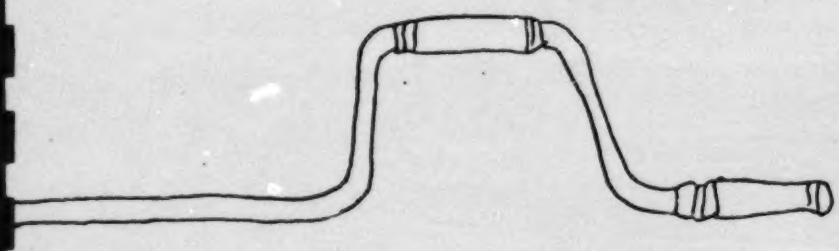
RATCHET WRENCH



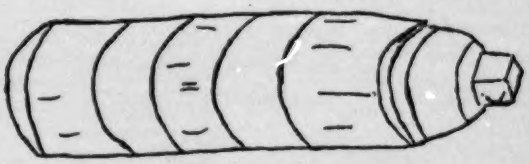
EXTENSION



BREAK OVER HANDLE



SPEED HANDLE

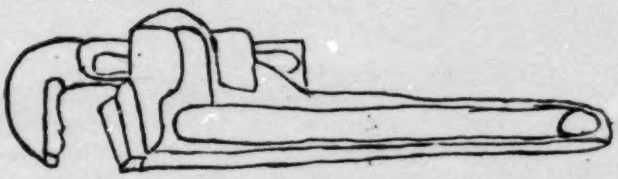


HAND IMPACT DRIVER

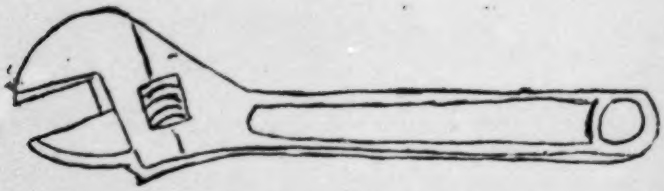
TORX BIT

SOCKET

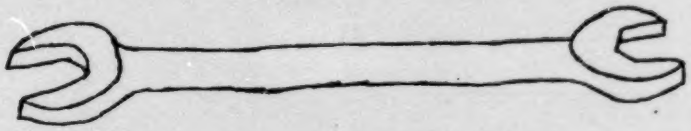
WRENCHES



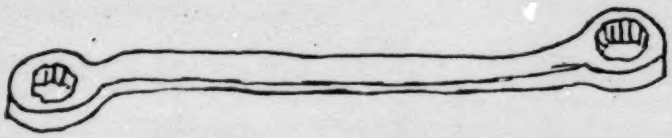
PIPE WRENCH



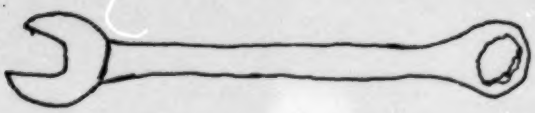
ADJUSTABLE WRENCH



END WRENCH



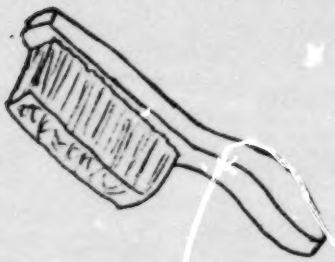
BOX END WRENCH



COMBINATION END WRENCH

BRUSHES

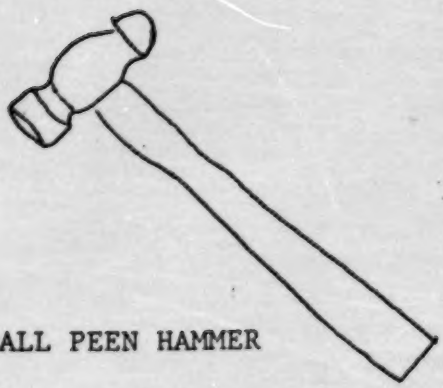
2.1



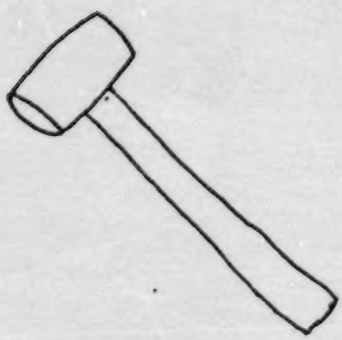
WIRE BRUSH

CARBON BRUSH

HAMMERS



BALL PEEN HAMMER

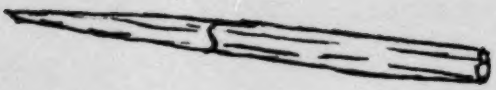


RUBBER MALLET

ASSORTED METAL CUTTERS

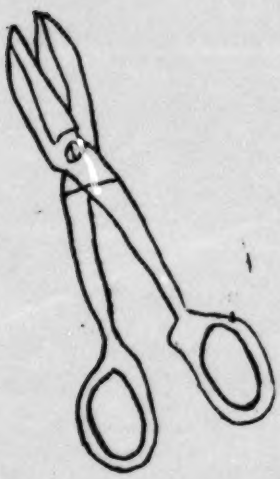
SCRATCH AWL

COLD CHISEL

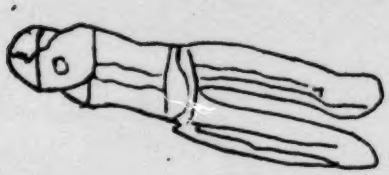


PUNCH

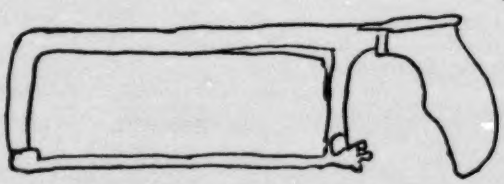
DRILL BIT



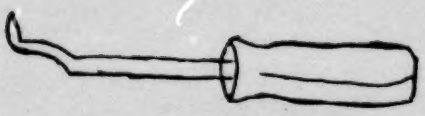
N SNIPS



CRUNCUT TOOL

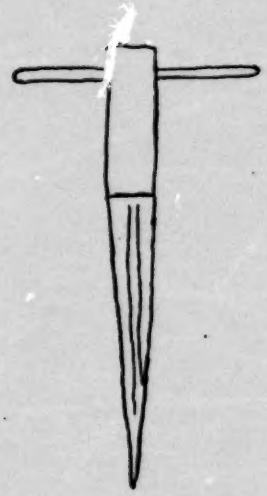


HACKSAW



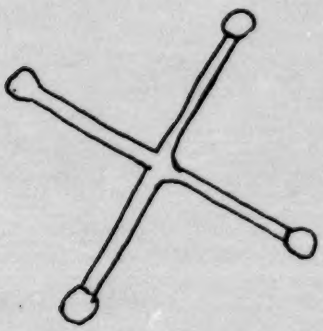
COTTER PIN PULLER

PRY BAR



TAPERED REAMER

FILE



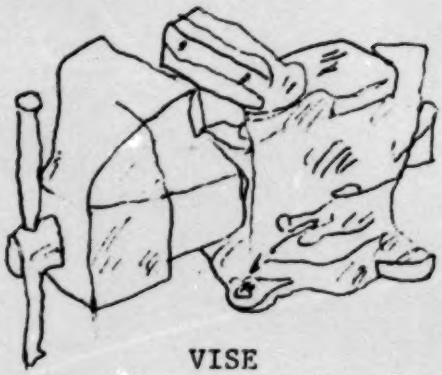
TIRE TOOL

TAP

ASSORTED PURPOSE (CONT'D)

2.1

DIE



VISE

PUTTY KNIFE

SOLDERING GUN

MEASURING TAPE

OIL CAN

Instructions:

The following reading contains information on straightening and specialty hand tools. Read it carefully then complete the worksheets.

Instrucciones:

La siguiente lectura contiene información tocante la herramienta de enderezar y herramienta especial. Léala cuidadosamente y luego conteste los ejercicios.

Vocabulary	Vocabulario
category	categoría
anvil	yunque
dolly block	remachador
dent	abolladura
surface	superficie - sobrefaz
hinge	gozne
solder	soldadura
putty	masilla
wedge	cuña
magnetic	magnético

Remember the following as you read.
Recuerde lo siguiente al leer.

1. The different straightening hand tools and their usage.
   La diferente herramineta y para que se usa.

2. Specialty tools.
   Herramienta especial.

Straightening and Specialty Hand Tools

Restoration of damaged auto bodies requires a knowledge of sheet metal formation, an evaluation of the damage and practical skill of special metal straightening hand tools. Basically, there are six categories of metal straightening hand tools; hammers, dollies, spoons, files, picks and filling and shaping tools. Each category contains various sizes and shapes of tools designed to work best in certain circumstances.

The following includes the six basic categories and the most common tools in each.

Hammers - are the most frequently used auto body repair tools and are primarily used in removing dents in sheet metal. They include the pick, dinging, bumping, cross peen, shrinking and magnetic trim hammers (see illustrations page 21).

Dolly Blocks - are basically anvils. They are held on one side of a dented panel while struck on the opposite side with a hammer. Dollies come in various designs that conform to panel shapes. The most common are egg, bumping, loaf, toe, heel, shrinking, comma or wedge and general purpose or railroad dollies (see illustrations on page 22).

Pick Tools - are especially designed pry bars which are also used as spoons. Most pick tools have pointed ends. The most common are curved short, curved long, deep throat curved, top rail, straight finishing, curved finishing and hooked finishing picks (see illustrations on page 23).

Spoons - are multi-purpose tools. They are used as pry bars, dolly blocks and to distribute hammer blows over wider areas. The most common are back up and driving spoons, spoon dollies and spring hammering spoons (see illustrations on page 24).

Files and Accessories - are used to level the surface of damaged panels and to check for high spots that may need further dinging. Included in this category are body file blade, straight file holder, curved file holder, flexible file holder, bumping or shaping file, reveal file holder, blades, body plastic finishing board and body plastic shaping file (see illustrations page 25).

Filling and Shaping Tools - are used for filling low spots with solder or putty. The most common are lead paddles and putty knives (see illustrations page 26).

A seventh category, specialty tools, are designed to aid the repairman in removing and installing parts easier. There is a large assortment of these tools which include drip molding pliers, door and window handle clip removers, reveal molding clip tool, windshield knife, vacuum lifter, molding clip pliers, pop rivet gun, locking strip tool, door hinge wrench, bumper bracket tool, door hinge aligner and body pull rod set (see illustrations page 27-28).

Auto body straightening and specialty hand tools are constantly being modified to cope with problems of new auto body construction. Technicians must keep informed of these changes.

Fill in the blanks

1. To make collision repairs it is necessary to have practical _____of special metal _____hand tools.

2. There are _____basic categories of metal straightening hand tools.

3. _____and _____are the most common tools used for filling low spots.

4. The pick and cross peen hammers are used to remove _____ in sheet metal.

5. Some tools used to distribute hammer blows over wider areas are _____? _____and hammering spoons.

True or False

_____1. Hammers are not used often in auto body repair.

_____2. Body blade, straight holder, curved holder and reveal holder are all types of spoons.

_____3. Pick tools are used as spoons.

_____4. Most picks have square ends.

_____5. Two of the most common pick tools are the curved short and the curved long.

_____6. Dolly blocks are used along with hammers to straighten dented panels.

_____7. Egg, loaf, and toe are three common pliers.

_____8. Drop molding pliers are included in one of the six basic categories metal straightening hand tools.

Match the following:

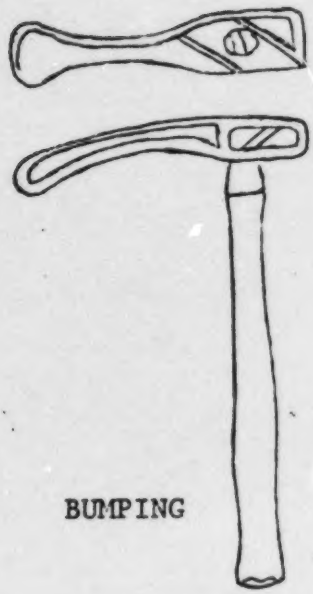
___Hammers	A. are basically anvils.
___Spoons	B. are used to apply solder or putty.
___Picks	C. most common are pick, dinging, bumping, cross peen, shrinking, and magnetic trim.
___Dolly blocks	D. used to level the surface of damaged panels.
___Files	E. multi-purpose tools.
___Filling and shaping tools	F. specially designed pry bars.

Circle the correct spelling for each.

resteration	restoration	restortion
straightening	straghtening	striaghtening
catigories	catagories	categories
hammers	hamers	hammrs
alignr	alegner	aligner
anvil	anvile	anvel
dolli	dolle	dolly
file	fyle	fil
soldre	sulder	solder
blads	blades	blaeds

HAMMERS

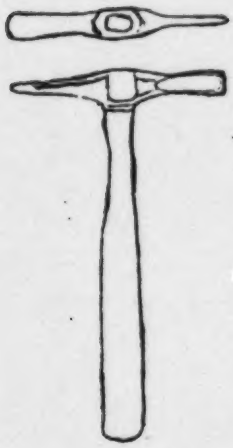
SHRINKING



BUMPING

PICK

MAGNETIC TRIM



CROSS PEEN

DINGING

DOLLY TOOLS

EGG

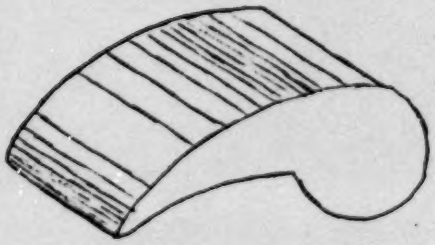
BUMPING

GENERAL PURPOSE OR
RAILROAD

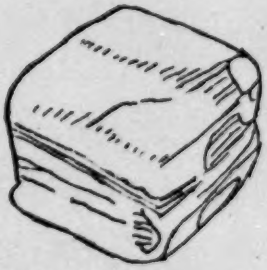
LOAF

TOE

HEEL

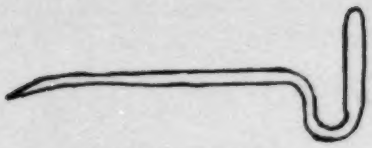


COMMA OR WEDGE

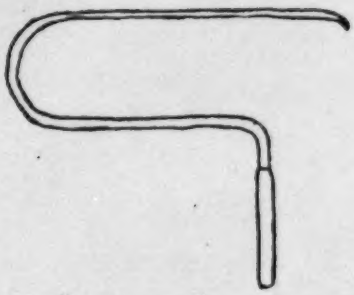


SHRINKING

PICK TOOLS

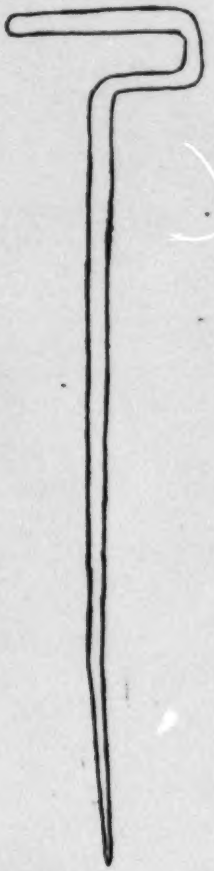


CURVED SHORT



DEEP THROAT CURVED

CURVED LONG



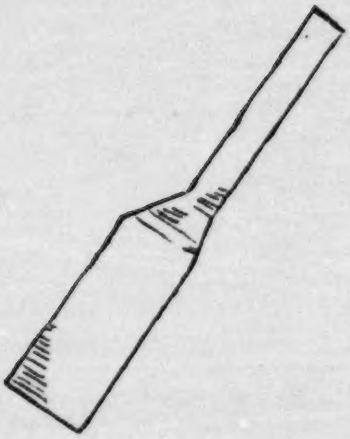
TOP RAIL

STRAIGHT FINISHING

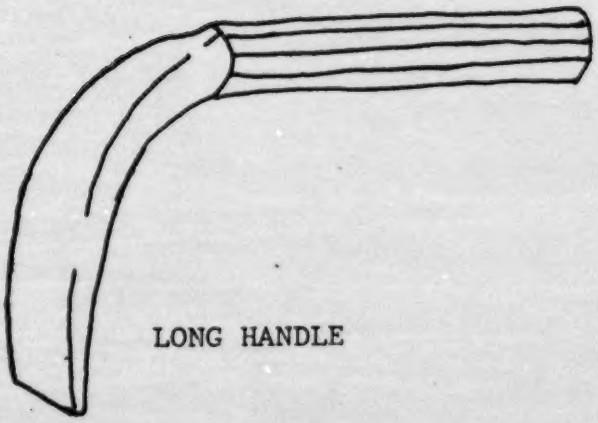
CURVED FINISHING

HOOKED FINISHING

SPOONS



BACK-UP AND DRIVING



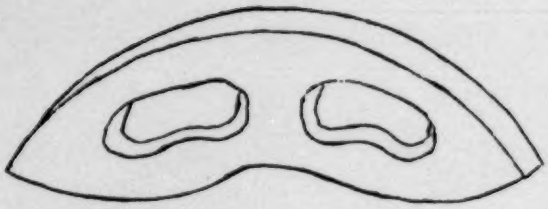
LONG HANDLE

SPOON DOLLY

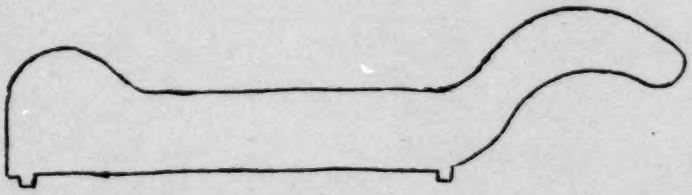
SPRING HAMMERING

FILES AND ACCESSORIES

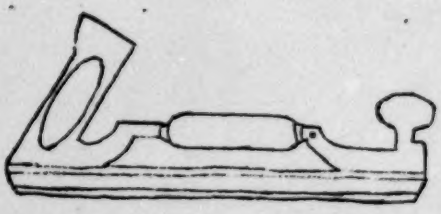
BODY FILE BLADE



CURVED FILE HOLDER

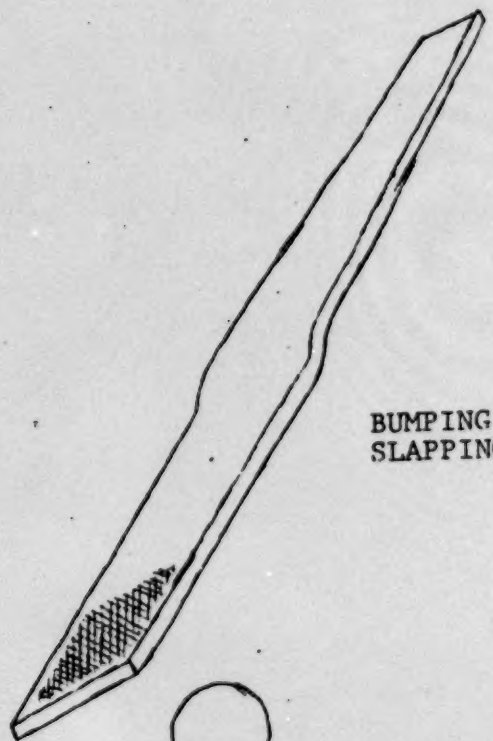


STRAIGHT FILE HOLDER

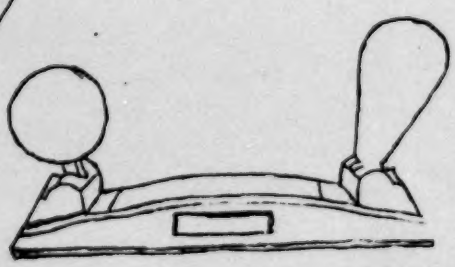


FLEXIBLE FILE HOLDER

REVEAL FILE HOLDER AND BLADES



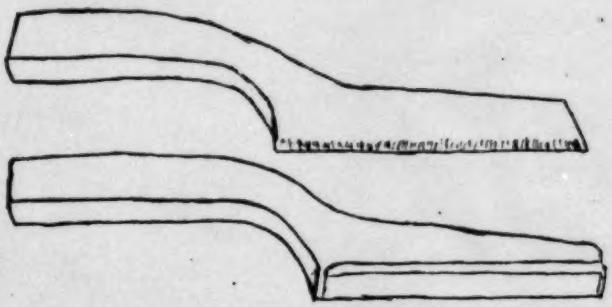
BUMPING AND SLAPPING FILE



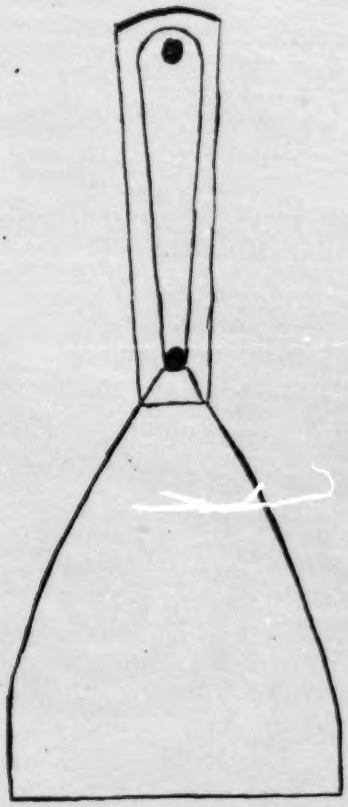
BODY PLASTIC FINISHING BOARD

BODY PLASTIC SHAPING FILE

FILLING AND SHAPING TOOLS

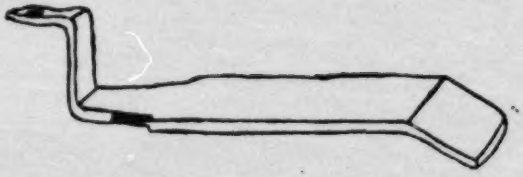


LEAD PADDLES

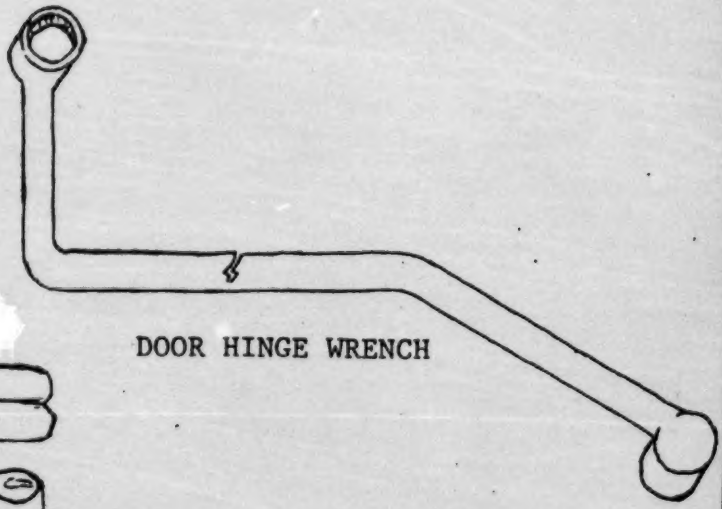


PUTTY KNIFE

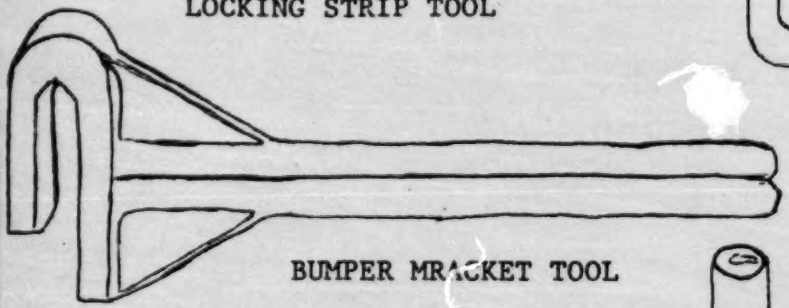
SPECIALTY TOOLS



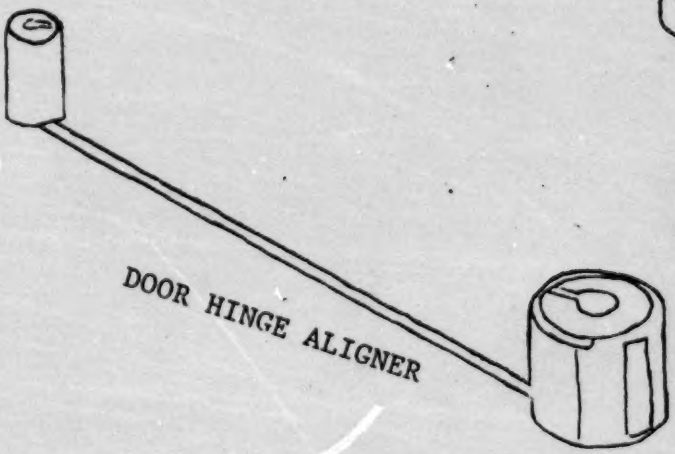
LOCKING STRIP TOOL



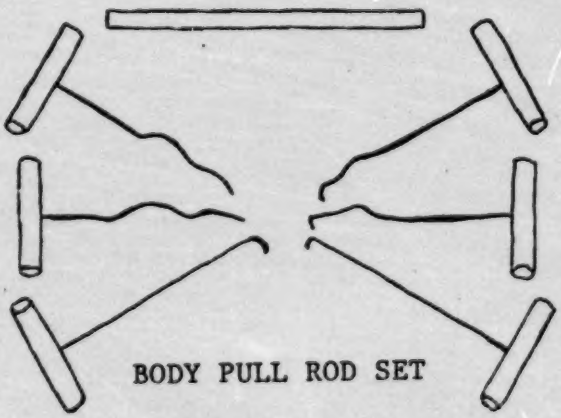
DOOR HINGE WRENCH



BUMPER MRACKET TOOL



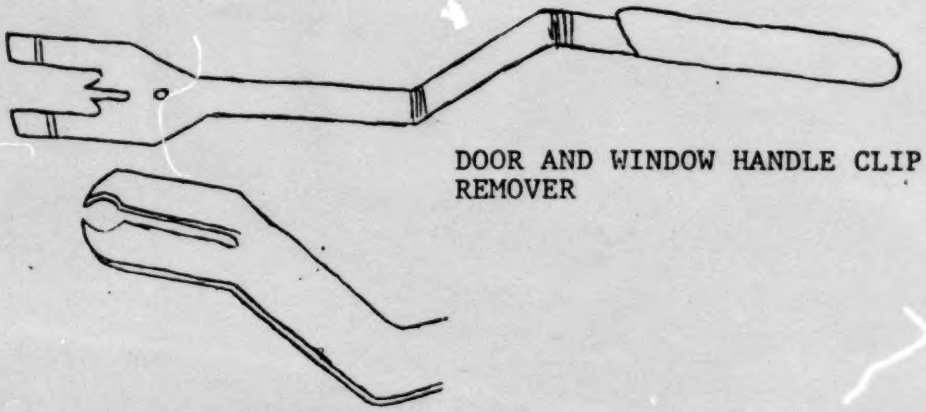
DOOR HINGE ALIGNER



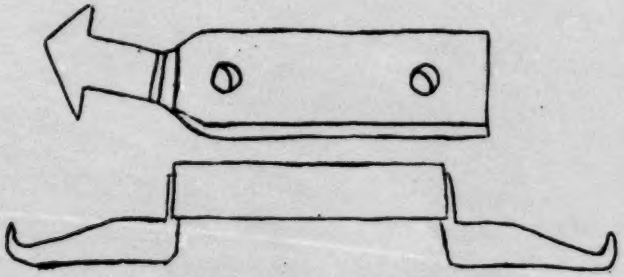
BODY PULL ROD SET

SPECIALTY TOOLS _ CONT'D

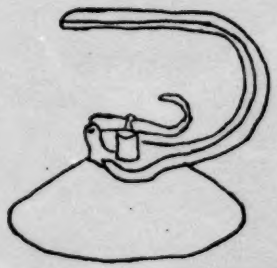
DEEP MOLDING PLIERS



DOOR AND WINDOW HANDLE CLIP REMOVER

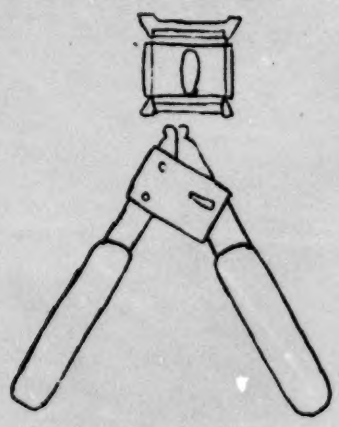


REVEAL MOLDING CLIP TOOL

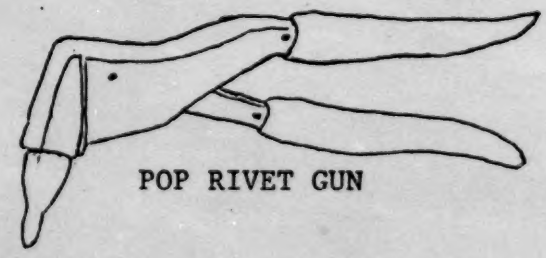


VACUUM LIFTER

WINDSHIELD KNIFE



MOLDING CLIP PLIERS



POP RIVET GUN

Instructions:

The following reading contains information regarding pneumatic and electrical power tools. Read it carefully then complete the worksheets.

Instrucciones:

La siguiente lectura contiene información con relación al equipo neumático y eléctrico. Léala cuidadosamente y luego conteste los ejercicios.

Vocabulary	Vocabulario
power	potencia
pneumatic	neumático
electric	eléctrico
grinder	afiladora
polisher	pulidor
drill	taladrador
file	lima
hammer	martillo
shears	cizallas
wrench	llave
sander	lijador

Remember the following as you read.
Recuerde lo siguiente al leer.

1. Power tools are either electric or pneumatically (air) powered.
   Herramienta de potencia motriz es eléctrica o neumática.

2. Uses of each power tool.
   El uso del equipo mecanizado.

Power Tools

Tools which require electric or pneumatic power are known as power tools. When they are used correctly they reduce greatly the amount of time which is usually required to perform a job.

Grinders

Grinders generally use abrasives to remove paint, rust, grind welds, etc. These tools may be powered electrically or pneumatically. The most common is the disc grinder available in seven and nine inch sizes. They should not be used at greater than normal RPM's for they endanger the operator and they heat up metal and cause it to warp. When the grinder is in operation moderate pressure should be used. Holding it at the correct angle is also important.

Polishers

Polishers are used along with a rubbing compound to bring about a smooth and glossy appearance to a painted surface. They resemble grinders, but have a lower RPM speed to avoid overheating of the painted surface. These tools may be electrically or pneumatically powered.

Drills

These tools are primarily designed for a variety of drilling purposes. Based on the size of the desired hole, different bits may be mounted on the drill. A pneumatically or electrically powered drill is available in the 1/4 inch size. Electric powered drills are available in the 3/8 and 1/2 inch sizes. Drills with proper attachments may also serve as grinders and polishers in hard to reach areas.

Pneumatic Files and Pneumatic Impact Tool

These tools are strictly pneumatic. Pneumatic files are similar to belt sanders in appearance, they are used to sand down filler and assist in locating low and high spots on panels. It is necessary to file flat on the panel at about 30° in order to match the initial form of the panel.

The pneumatic hammer rivets, chisels, cuts spot welds and removes panels.

Metal Shears

Are pneumatically or electrically powered. They are used primarily to cut sheet metal.

Impact Wrenches

They are used to loosen and tighten bolts or nuts. Are pneumatically and electrically powered.

Cutting Saws, Heat Guns and Bench Grinders

These tools are strictly electric powered. The circular and the jig saw are used to cut sheet metal or panels.

Heat guns are used primarily to heat panel surfaces.

The bench grinder is a stationary power tool used to sharpen drill bits, grind metal, dress punches and chisels, etc.

Sanders

Sanders remove scratches left from grinding by means of an abrasive. They also iron out low spots in metal, remove paint and provide a smooth surface in preparation for the finishing touches. There are three basic types of sanders, disc (rotary), oscillating (orbital) and belt sanders.

The disc (rotary) sander should be used in long sweeping back and forth motions and tipped just enough to bend the tip of the disc slightly as on Fig 1 page 36.

The oscillating sander requires even back and forth motions while the orbital sander requires a delicate circular motion. These two basic type sanders are powered electrically and pneumatically.

The belt sander operates strictly on electricity. This device has an angular flat surface, a built in vacuum suction and is generally used for fiber glass body repairs. A considerable amount of practice is required before a major job is attempted because over operating in one spot may result in cutting of metal.

Safety Rules

The following safety precautions apply to power tools. There are also safety rules which apply to individual tools, they are not listed here.

1. Wear safety goggles.
2. Locate on and off switch.
3. Hands and feet must be dry when operating electric powered tools.
4. Electric powered tools must be properly grounded.
5. Keep a firm grip when operating power tools.
6. Use power tool for its intended purpose only.
7. Tools must be in good operating condition.
8. Unplug tool when changing attachments.
9. Never try to stop moving part of a tool with hands.
10. Keep tools in proper working condition.

Fill in the blanks

1. Power tools require _____ or _____ power.

2. A tool which uses abrasives to remove paint and rust is a _____.

3. _____ resemble grinders but are used along with a rubbing compound to bring about a smooth and glossy appearance to a painted surface.

4. Tools designed for drilling purposes are _____.

5. A tool which resembles a belt sander and is used to sand down filler is a pneumatic _____.

6. A pneumatic _____ rivets, chisels and cuts spot welds.

7. Metal _____ are used primarily to cut _____ metal.

8. Bolts or nuts may be loosened or tightened with an electric or _____ powered _____ wrench.

9. Scratches left from grinding are removed with _____.

10. The three basic types of sanders are _____, _____ and _____.

True or False

_____1. Polishers are used for removing scratches left by grinders.

_____2. Bench grinders are used to sharpen drill bits, grind metal, dress punches and chisels, etc.

_____3. Power files are strictly electric powered.

_____4. Pneumatic hammers rivet, chisel and cut spot welds.

_____5. Safety precautions must be observed when operating power equipment.

_____6. Hands and feet should not be wet when operating electrical equipment.

_____7. Moving parts on power tools should not be stopped with hands.

_____8. Always maintain a firm grip when operating power tools.

_____9. Belt sanders are used mostly for fiber glass body repairs.

_____10. Oscillating sanders require even back and forth motion.

_____11. Heat guns are used to cut panels only.

_____12. Cutting saws are pneumatic powered only.

_____13. Pneumatic drills are available in 1/2 inch sizes only.

_____14. Grinders use abrasives to remove scratches left from sanding.

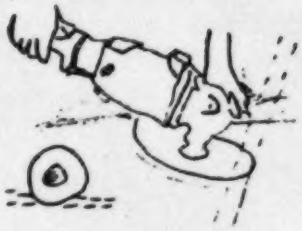
_____15. Power tools, used properly, reduce greatly the amount of time required to perform a job.

Fill in the blanks

gr__n__er	po__is__er
s__w	d__ill
b__n__h	g__n
sa__d__r	__he__rs
f__le	h__m__er
p__eu__at__c	e__ec__ric
o__ci__lat__ng	o__bi__al
r__ta__y	be__t
w__en__h	i__pa__t
p__we__	sa__et__

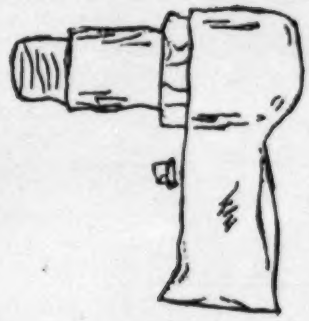
CORRECT

ELECTRIC GRINDER

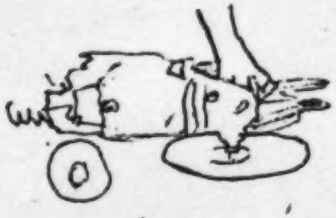


INCORRECT

PNEUMATIC GRINDER



PNEUMATIC HAMMER



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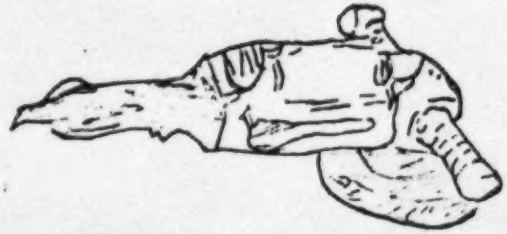
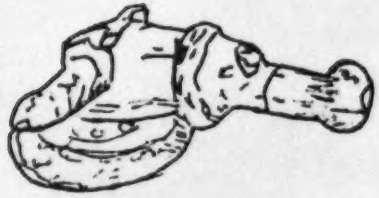
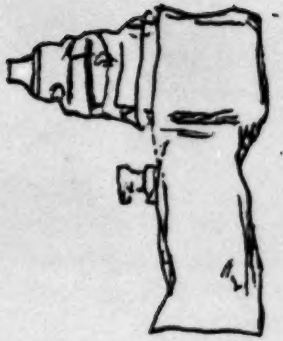


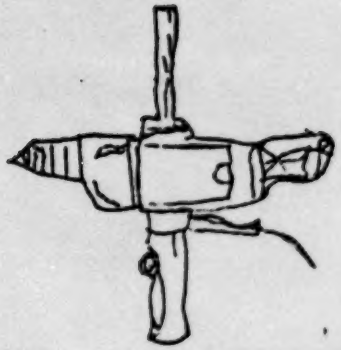
ELECTRIC POLISHER



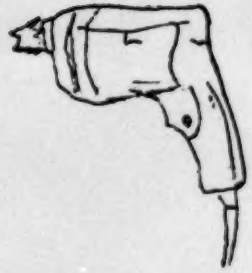
PNEUMATIC POLISHER



PNEUMATIC DRILL

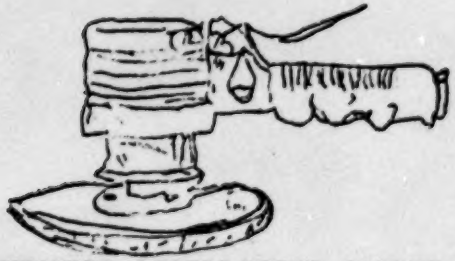


1/2" ELECTRIC DRILL

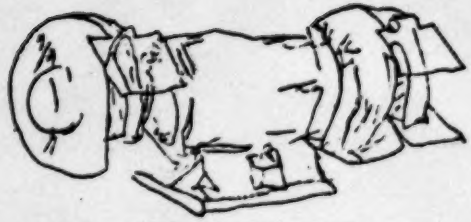


1/4" ELECTRIC DRILL

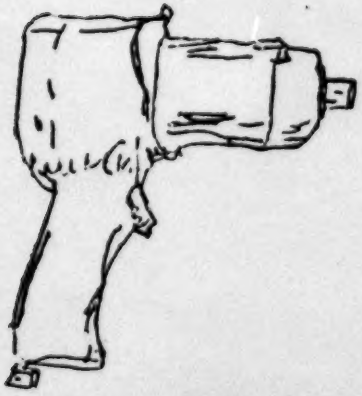
ORBITAL SANDER



PNEUMATIC OSCILLATING SANDER

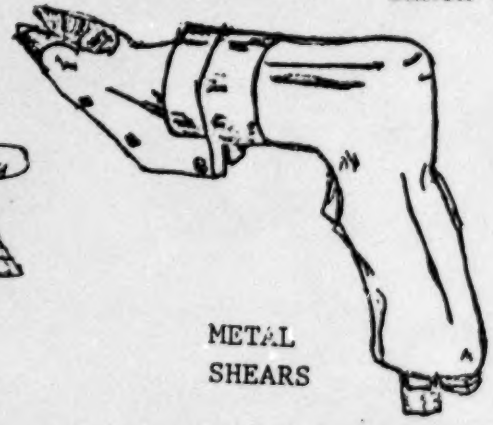


BENCH GRINDER



PNEUMATIC IMPACT WRENCH

PNEUMATIC FILE



METAL SHEARS

Instructions:

The following reading contains information on major collision repair. Read it carefully then complete the work sheets.

Instrucciones:

La siguiente lectura contiene informácion tocante equipo de reparo para daño extensivo. Léala cuidadosamente y luego conteste los ejercicios.

Vocabulary	Vocabulario
damage	daño
stationary	estacionario
portable (dozer)	portátil
chain	cadena
clamp	abrazadera
hydraulic jack	gato hidráulico
straighten	enderezar
hydraulic equipment	equipo hidráulico
rail	carril
anchor	ancla
wedge	cuña

Remember the following as you read.
Recuerde lo siguiente al leer.

1. The types of straightening units available.
   Tipos de unidades enderezadoras disponibles.

2. Type of hand portable equipment used.
   Tipo de equipo portátil que se usa.

Major Collision Repair Equipment

Before the auto body technician attempts any kind of repair, a careful inspection of the damage is necessary. In many cases, vehicles have suffered such extensive damage that the frame and body may have been twisted out of their original forms. The kind of damage and possible means of correction must be determined. Certain points within the body should be measured and gauges may also be used to determine extent of damage on the frame and body.

After damage inspection has been completed, it then becomes the job of the technician to make the necessary repairs. If the body and/or frame have been distorted, major collision repair tools will have to be utilized to bring the vehicle back to its original form. The tools, stationary or portable, are available in three basic units; stationary rack type, portable "dozer" type and rail or floor type.

Stationary rack type units are braced down to the floor and vehicles are driven onto these devices. The vehicle is chained and clamped to the heavy duty racks. The racks are usually 18" above floor level. Hydraulic jacks are used to apply pressure where the frame needs to be straightened.

Dozer type units have one big advantage over stationary units because they can be moved. The vehicle is secured on safety stands and the portable unit is moved to desired vehicle straightening position. Hydraulic equipment is also used to force damaged areas back into alignment.

Rail or floor type equipment refers to the tie down with pull post body and frame straightening unit and the channel mount units.

The tie down with pull post units are perhaps the most popular and are also very effective. The auto body repair shop is designed in such a manner that the damaged vehicle is driven in line to the tie downs. These are pots which serve as anchor points. Each one of these points can resist up to approximately 10 tons of pull. These units pull, bend, stretch, lift, etc. damaged or twisted areas back to original forms. The hydraulic jack provides the necessary power.

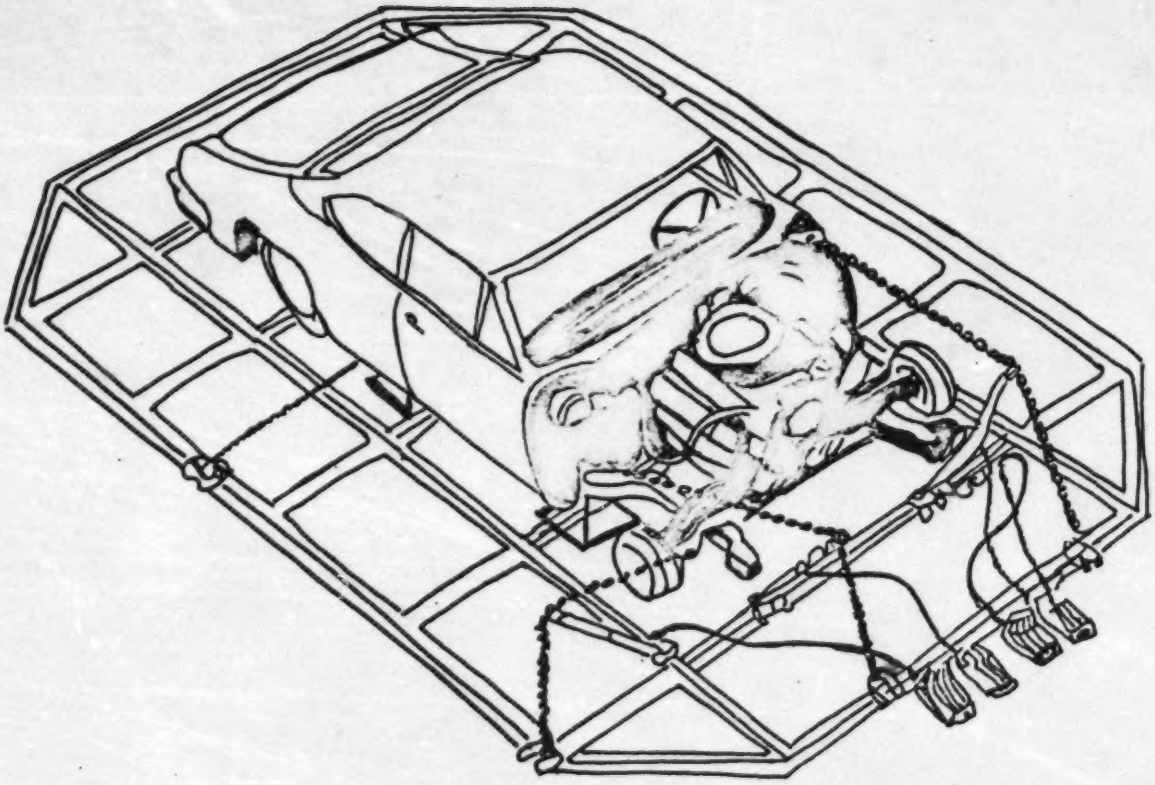
In rail type units, rails are placed on the floor. Necessary straightening equipment is attached to the rails at any convenient point. This type of unit and the tie down units are very similar. Hydraulic units also provide the straightening power.

Hand portable equipment, hydraulic jacks, is also available and is used for straightening sheet metal rather than strong metals. Attachments such as a ram, a wedge, clamps, etc. are used with this equipment.

Major collision repair tools may be used to assist the technician in performing his job effectively. These devices may prove to be dangerous if proper safety rules are not carried out. The following are some safety precautions which should be followed.

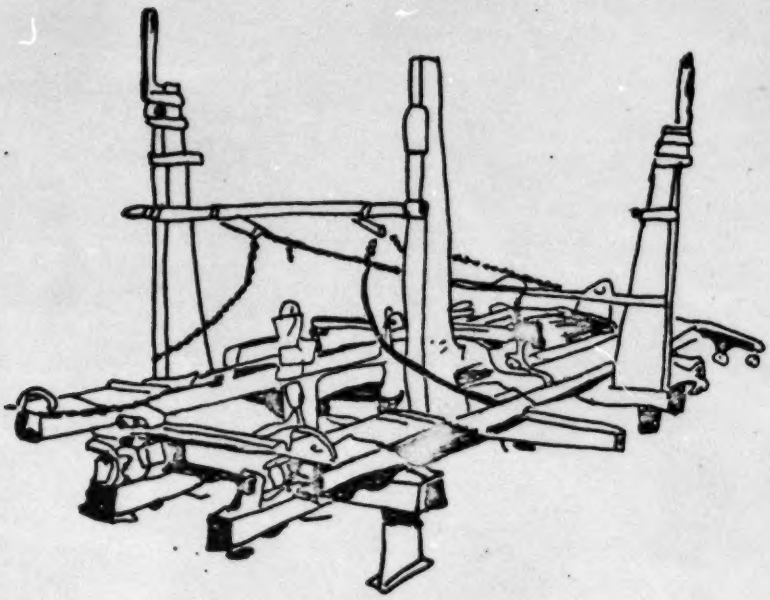
1. Don't tie chains around sharp corners.
2. Never heat chains.
3. Do not bolt chains together.
4. Cover chains with tarpaulin or other heavy material to avoid whip like action should chain break.
5. Chains should be in straight line to direction of pull.
6. All chain anchors should be secure.
7. Do not stand in front of power equipment.

Rail or Floor Type Equipment

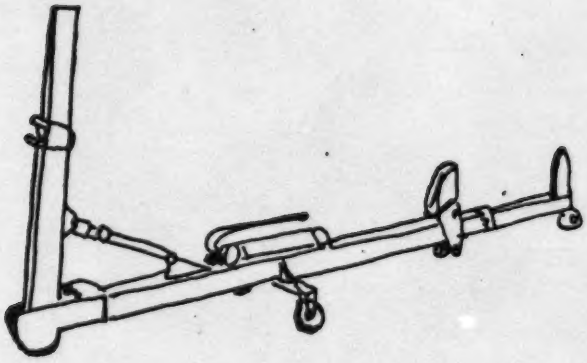


Stationary Rack Type Equipment

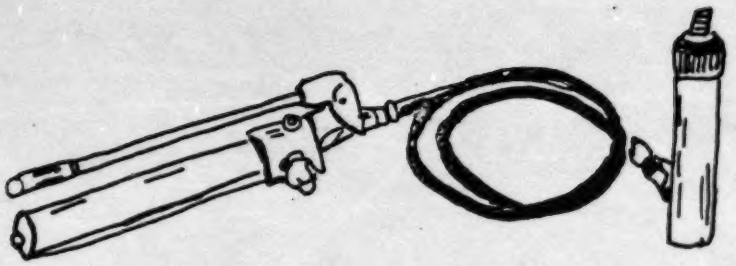
2.4

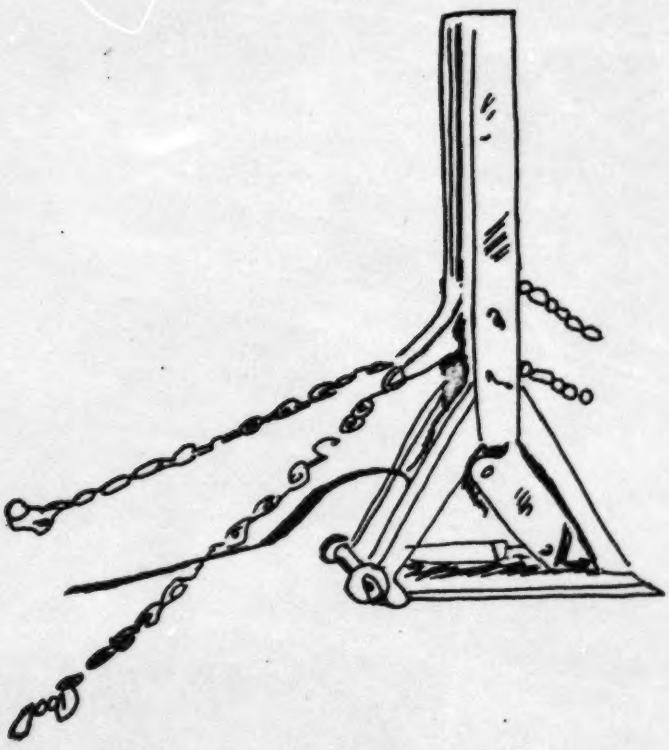


Dozer Type Unit



Accessories for Major Collision Repair Equipment





Fill in the blanks

1. If proper _____ _____are not observed collision repair tools may be _____.

2. A _____ , _____and _____are three examples of hydraulic jack attachments.

3. Rail units are _____ on the floor.

4. When inspecting collision damage, certain _____within the _____should be _____.

5. _____and _____are the two categories of major collision repair equipment.

6. _____units are braced to the floor.

7. On stationary units vehicles are _____and _____ to the heavy duty _____.

8. Racks on _____units are usually ____inches above floor level.

9. When using a dozer unit the _____is secured on safety stands and the unit is moved to desired area.

10. Tie down with pull post units have _____ _____which serve as _____points.

True or False

____1. The auto body technician begins necessary repairs immediately after vehicle is brought in the shop.

____2. Rail type devices fasten the car to the unit.

____3. Hydraulic jacks are primarily used to straighten sheet metal.

____4. Tie down - pull post units allow for cars to be driven onto them.

____5. Rail and tie down units are very similar.

____6. Dozer units can be moved.

____7. Major collision repair tools are utilized when body and/or frame have been deformed.

____8. Stationary rack units are similar to dozer units.

____9. There are two categories of major collision repair units.

___10. Hydraulic jacks are portable equipment.

Matching

_____Hydraulic jacks	A. can resist up to 10 tons of pull.
_____Hydraulic equipment	B. refers to straightening to original form.
_____Anchor points	C. supply necessary power for straightening units.
_____Tie down units	D. used to force damaged areas back into alignment.
_____Alignment	E. pull, bend, stretch and lift.

Briefly state seven safety precautions which should be followed while using the tools mentioned.

Instructions:

The following reading contains information on refinishing equipment. Read it carefully then complete the worksheets.

Instrucciones:

La siguiente lectura contiene información tocante al equipo de pintura. Léala cuidadosamente y luego conteste los ejercicios.

Vocabulary	Vocabulario
repair	reparación
damage	daño
spray gun	pistola rociadora
air compressor	comprimidora de aire
air regulator	pivote regulador
respirator (paint mask)	máscara contra gases
paint booth	cabina para pintar
drying equipment	equipo de secar

Remember the following as you read.
Recuerde lo siguiente al leer.

1. Painting equipment and the function of each tool.
   El equipo de pintura y para que se usa.

Refinishing Equipment

The final step in repairing damaged auto bodies is repainting. In most shops, especially small ones, the technician performs both straightening and repainting jobs. Repainting, like metal straightening, requires the very best tools to insure quality in the finished product.

The quality of the paint job depends on the technician's knowledge of paints, painting skill and maintenance of such tools. Basically, the most important painting equipment are the spray gun, air compressor, air regulator, respirator, paint booth and paint drying equipment. The following are descriptions of such equipment.

Spray Guns - mix paint with air into a fine mist which then is applied evenly on the surface of a vehicle's body. Basically there are two types of spray guns; the single unit and the remote cup assembly.

The single unit is formed by attaching the paint container to the spray gun and forming one unit. Major components of a single unit gun are air cap, fluid tip, fluid needle, trigger, fluid adjustment screw, air valve, spreader adjustment valve, siphon tube, siphon cup, vent port, cup seal and siphon release lever.

The remote cup assembly consists of a gun which is separate from the paint cup. The paint cup, or paint pressure pot, delivers the paint by means of a fluid hose. The components are similar to those of the single unit gun.

Air Compressor - takes air from the atmosphere and compresses it to a given pressure. The two types of compressors are the single stage and the two stage.

The two stage compressor is preferred in auto body because it delivers a larger volume of air at a higher pressure (see illustrations on page 52).

Air Regulator - assures that clean dry air is delivered to a spray gun by preventing foreign matter from entering air lines. It also maintains a steady supply of air (see illustrations page 52).

Paint Mask or Respirators - are masks that must be worn over the nose and mouth during spray painting. There are various types; some remove dust and/or toxic fumes from the air (see illustrations page 51).

Paint Booth - is an enclosed compartment used during spray painting. This booth must be dust proof and should contain adequate lighting, an exhaust fan and air intake filters. There are two basic types of spray booths: Dry type booths are used most by auto body refinishers and the Air Washer type is used in production work (see illustrations page 51).

Paint Drying Equipment - ranges from huge batteries of infrared lamps to a single bulb type unit. This equipment is utilized to hasten the drying of finishes (see illustrations page 51).

The repairmen who are familiar with this equipment must learn the proper maintenance procedures. Also practice in actual painting is needed to develop a salable skill.

Fill in the blanks

1. In most small shops the technician performs both _____ and _____jobs.

2. Paint drying equipment ranges from huge _____ of _____lamps to a _____ _____type unit.

3. Two types of spray guns are the _____ _____and the _____ _____assembly.

4. The single unit gun has _____major components.

5. The remote cup _____consists of a _____which is separate from the paint cup.

6. Two types of air compressors are _____stage and _____ _____.

7. The _____ _____compressor provides a larger volume of air at a higher pressure.

8. _____must be worn when spray painting.

9. _____is an enclosed compartment used during spray painting.

10. The two types of paint booths are _____and _____.

True or False

_____1. Repainting is the last step in auto body repair.

_____2. The mechanic performs the repainting jobs.

_____3. Drying equipment may be used to hasten the drying paint.

_____4. Some types of paint masks remove dust and/or toxic fumes from the air.

_____5. There are basically eight important elements in painting equipment.

_____6. There are three types of air compressors.

_____7. Air regulators prevent foreign matter from entering air lines.

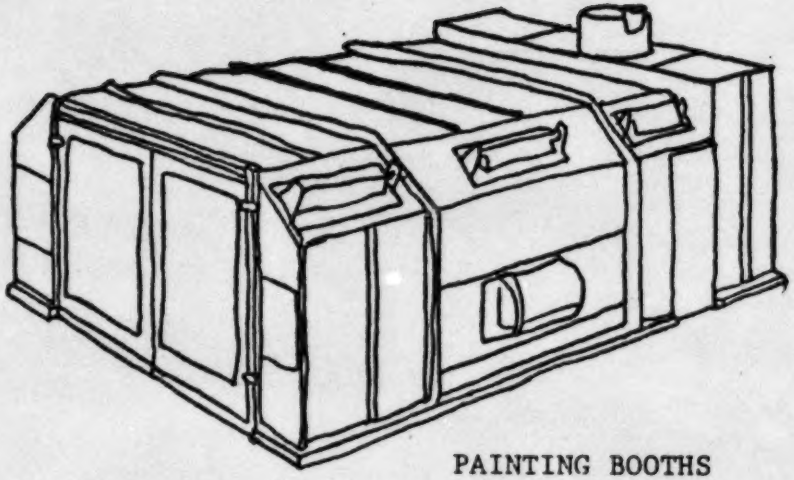
_____8. The device which maintains a steady supply of air is called the air compressor.

_____9. The air compressor and the respirator perform basically the same jobs.

_____10. The paint booth must be dust proof.

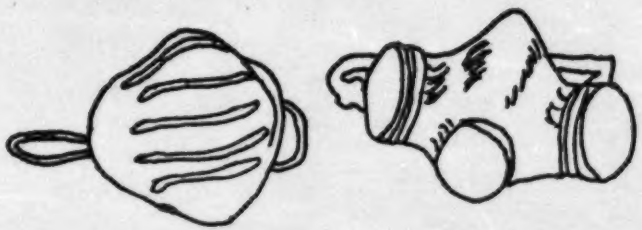
Match the following:

spray guns	_____	A. are also known as paint masks.
paint booth	_____	B. compartment used during spray painting.
air compressor	_____	C. mix paint with air.
air regulator	_____	D. takes air from atmosphere and compresses it to a given pressure.
respirators	_____	E. assures that clean dry air is delivered to spray gun.

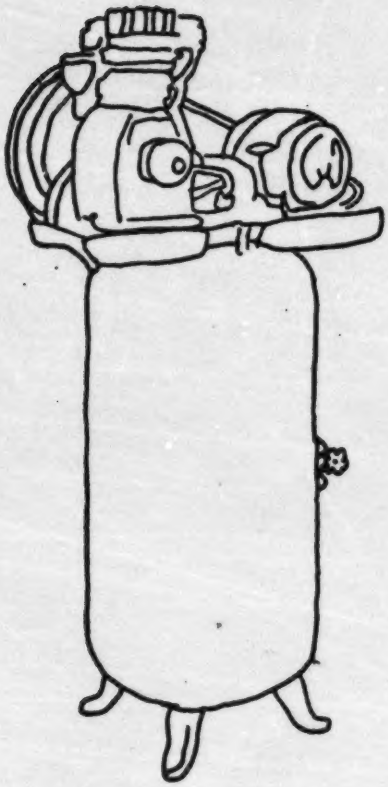


PAINTING BOOTHS

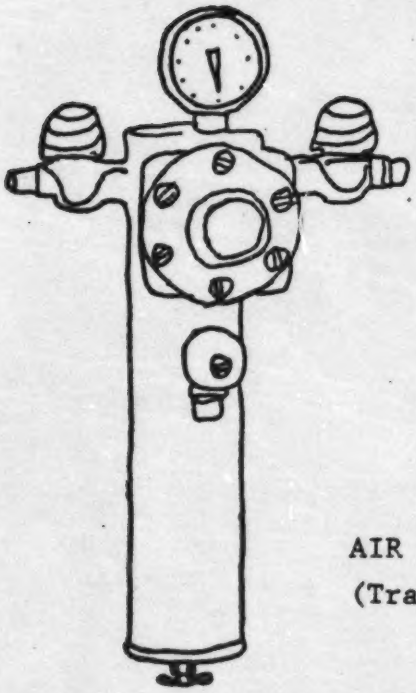
SPOT DRYING LAMPS



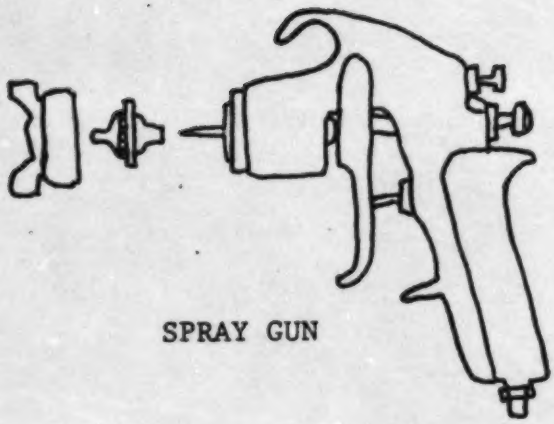
RESPIRATORS



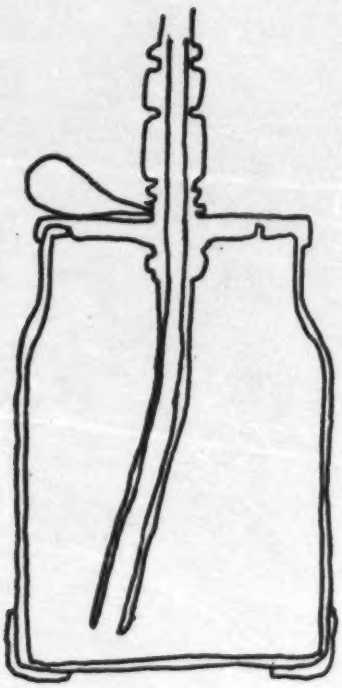
AIR COMPRESSOR



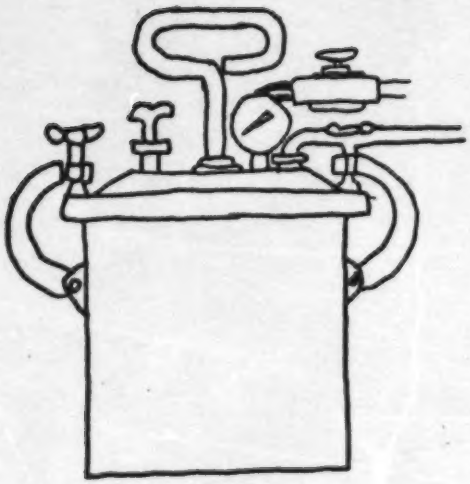
AIR REGULATOR
(Transformer)



SPRAY GUN



SIPHON CUP



PAINT PRESSURE POT

POST-TEST

General Purpose Hand Tools

___Pliers

___Wrenches

___Socket Sets

___Hammers

___Brushes

___Screwdrivers

___Assorted Metal Cutters

A. the standard and the phillips are the two most common.

B. used for holding or turning nuts or bolts.

C. used for cutting or punching holes in metal.

D. tools used for bending, holding, cutting, etc. and vary in size and shape.

E. are used for removing rust and paint.

F. come in six or twelve point type which fit and grip six sided nuts and bolts snugly.

G. most frequently used auto body repair tools.

Straightening Hand Tools

___Spoons

___Dolly blocks

___Pick tools

___Hammers

___Files & Accessories

___Filling and shaping tools

A. are used for filling low spots with solder or putty.

B. are multi-purpose tools used as pry bars, and dolly blocks. They distribute hammer blows over wider areas.

C. primarily used in removing dents in sheet metal.

D. are basically anvils.

E. are especially designed pry bars which are also used as spoons.

F. are used to check for high spots that may need further dinging.

Power Tools

____Grinders	A. are used to tighten and loosen bolts and nuts.
____Polishers	B. use abrasives to remove paint, rust, grind welds, etc.
____Drills	C. are primarily designed for a variety of drilling purposes.
____Pneumatic files	D. rivets, chisels, cuts spot welds and removes panels.
____Pneumatic impact tool	E. are used along with a rubbing compound to bring about a smooth and glossy appearance to a painted surface.
____Metal shears & Cutting saws	F. are stationary power tools used to sharpen drill bits, grind metal, dress chisels, etc.
____Pneumatic wrenches	G. are used primarily to heat panel surfaces.
____Heat guns	H. remove scratches left from grinding by means of an abrasive.
____Sanders	I. are used primarily to cut sheet metal or panels.
____Bench grinders	J. are used to sand down filler and assist in locating low and high spots on panels.

Major Collision Repair Equipment

____Stationary rack type units	A. are portable units.
____Dozer type units	B. are braced down to the floor and vehicles are driven onto these devices. Racks are usually 18 inches above floor level.
____Rail or floor type equipment	C. have pots on the floor which serve as anchor points that resist up to 10 tons of pull.

Refinishing Equipment

___Spray guns

___Air compressor

___Air regulator

___Respirators

___Paint booth

___Paint drying equipment

A. are worn over nose and mouth during spray painting.

B. assures that clean dry air is delivered to spray gun.

C. includes a single bulb type unit and hastens the drying of finishes.

D. mix paint with air into a fine mist and apply it evenly to body surface.

E. is a compartment used during spray painting.

F. takes air from the atmosphere and delivers air at given pressure.

General Safety

A. Electric Power Tools

___Locate on and off switch

___Don't tie chains around sharp corners.

___Wear safety goggles.

___Hands and feet must be dry when operating.

___Never heat chains.

___Unplug tools when changing attachments.

___Do not bolt chains together.

___All chain anchors should be secure.

___Never attempt to stop moving part of tool with hands.

___Chains should be in straight line with direction of pull.

B. Major Collision Repair Equipment

Vocabulary	Vocabulario
abrasive	raspante
accessory	accesorio
accident	accidente
adjustable	ajustable
anchor	ancla
anvil	yunque
atmosphere	atmósfera
bend	encorvadura
blade	hoja
bolt	tornillo
bracket	abrazadera
brush	cepillo
bulb	bulbo
bump	golpe
carbon	carbón
category	categoría
chain	cadena
chisel	escoplo
clamp	abrazadera
clip	sujetador
collision	choque
combination	combinación
compression	compresión
conform	conformar
curve	curva
cut	corte
damage	daño

Vocabulary	Vocabulario
delicate	delicado
dent	abolladura
design	deseño
diagonal	diagonal
dinging hammer	martillo de chapista
disc	disco
distort	torcer
distribute	distribuir
dolly block	remachador
drill	teladrador
egg	huevo
electric	eléctrico
endanger	arriesgo
evaluate	evaluar
extension	extensión
extractor	extractor
file	lima
flexible	flexible
form	forma
formation	formación
frame	armazón
frequent	frequente
glossy	lustroso
goggles	anteojos de seguridad
grease	grasa
grinder	afiladora
grip	apretón
hammer	martillo

Vocabulary	Vocabulario
hacksaw	seguesta
hazard	arriesgar
heel	talón
hinge	gonze, bisagra
hose	manguera
hydraulic	hidráulico
impact	impacto
install	instalar
lead	plomo
level	nivel
lift	levantar
loaf	hogaza
magnetic	magnético
maintenance	mantenimiento
major	mayor
mushroom	hongo
needle	aguja
nut	tuerca
operator	operario
orbital	orbital
oscillate	oscilar
paint	pintar
panel	panel
pick	pico
pliers	tenazas
pneumatic	neumático
polisher	pulidor
portable	portátil

Vocabulary	Vocabulario
power	potencia
practice	práctica
pry	arrancar
punch	punzar
rack	portaequipaje
rachet	trinquete
reduce	reducir
regulator	regulador
respirator	máscara contra gases
restore	restaurar
rivet	remache
rule	regla
rust	moho
safety	seguridad
sander	lijador
scratch	rasguñar
screwdriver	destornillador
shape	hechura
shears	cizallas
shrink	encoger
siphon	sifón
skill	abilidad
socket	llave
solder	soldar
specific	específico
speed	velocidad
spoon	cuchara
[illegible]	[illegible]
portable	portátil

Vocabulary	Vocabulario
spray gun	pistola atomizadora
stationary	estacionario
straight	derecho
struck	golpeado
switch	interuptor
technician	técnico
twist	torcer
vacuum	vacío
various	varios
vehicle	vehículo
warp	torcer
wedge	cuña
wire	alambre
wrench	llave